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EXPLORING THE RELATIONSHIP BETWEEN MILITARY SPENDING & INCOME INEQUALITY IN SOUTH ASIA

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EXPLORING THE RELATIONSHIP BETWEEN MILITARY SPENDING & INCOME INEQUALITY IN SOUTH ASIA

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ABSTRACT

The basic objective of this paper is to examine the effect of military spending on income inequality in four major South Asian economies. In the process, we also control for other possible key determinants of income inequality subject to data availability. Using panel regression fixed effects analysis for the study period 1975 to 2005, we find from our estimates that there is a positive effect of military expenditure on income inequality. Also we find there is a direct relationship between wartime military spending and income inequality and an inverse relationship between peacetime military spending and income inequality. Given the wide range of socio economic and political problems ailing South Asia, these results gain paramount importance, suggesting that reduction in military spending could reduce income inequality, thereby paving way for economic development and progress.

Keywords: Defense Spending; Income Inequality & South Asia

JEL Classification: H 56; I 30; O 53.

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1. Introduction

A large number of previous works in literature have focused on the determinants of military expenditure in developing countries which is important given the negative effect of militarization on economic growth and development[1]. The effects of military spending on other key macro economic variables have also been explored in the literature. But, the relationship between defense sector growth and income inequality is largely left uncovered. Traditionally, the studies in literature related to military spending was mostly on issues concerning to income, economic growth, development, social sector development, education, health, employment, inflation and spillover effects on other industries. We do agree with these wide range of concerns raised by some of the prolific studies in past, but we also believe that there is strong evidence especially in developing countries that military expenditure is also strongly associated with income inequality. Though there are some studies by Abell (1994), Hamid Ali & Galbraith (2005), concreate studies on South Asia are absent. This paper tries to fill this existing gap in the first place by empirically testing the implications of military spending on income inequality of four major South Asian economies namely, India, Pakistan, Sri Lanka and Bangladesh. We then share one major criticism of early empirical works[2] on the link between military spending and income inequality is the problem of endogenity. The causality could well run in both directions. In determining the income inequality, it is possible that there can be endogenity problem with military spending. But, the earlier works were largely based on OLS regressions, treating military spending as exogenous to the income inequality. We believe that the natural progression from this is to address the problem of endogenity of military spending by creating appropriate set of instrument variables estimator. We also confirm this by conducting endogenity test in two stages.

Opportunity Cost Burden Effect: The Theoretical Underpinning

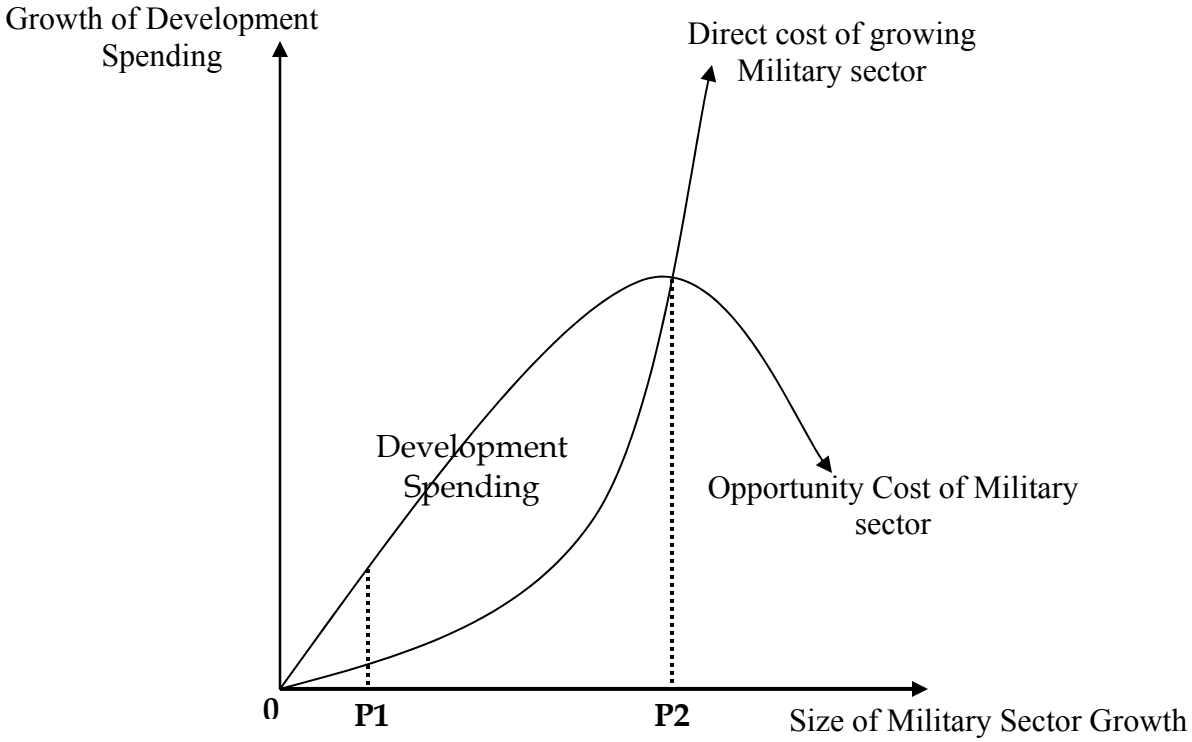
We formulate *Opportunity Cost Burden Effect* model which explains the implication of higher defense spending on government resources and the opportunity cost foregone towards spending on development purposes thereby leading to higher levels of inequalities. Based on this theoretical underpinning, the paper empirically examines the association between the military spending and income inequalities in South Asia. This is a result of an effort to put in perspective in a model form as to how military spending can influence income inequality and at what cost does this military sector growth comes. Figure 1 illustrates how military sector growth affects the income inequality and social and human development in an economy at the expense of diminishing returns to social development sectors. As larger proportions of a country's productive resources are diverted towards funding the military sector growth, its long run impact on development expenditure is expected to be negative. As defense spending increases rapidly, the total government expenditure also increases at a faster rate. But, this rapid increase in military

[1] Detailed analysis large section of studies related to Military Expenditure and their effects have been covered extensively by Gleditsch, Bjerkholt, Cappelen, Smith & Dunne (1996) in the edited volume of the book, "The Peace Dividend"

[2] Exception from this being Hamid E Ali & Galbraith (2005) who address this problem using simultaneous equation method.

spending has a cost associated with it. This is because, to fund this ever increasing defense spending, the government would be forced[3] to cut its expenditure on other sectors (related to development). As defense spending growth increases beyond a point (P2) the development spending will start declining at a much faster rate.

Figure – 1: Opportunity Cost Burden Effect



This means that the cost of the next best alternative use (opportunity cost) is forgone by the country as it diverts development expenditure towards funding the military sector growth requirements. Thus, we see two curves, one taking the form of convex which is the total military expenditure and the other taking the form of concave, development spending. Meaning, the net effect on overall economic growth may be positive, if the defense burden is smaller. This gives the government ample scope to divert the resources towards development spending, which would yield benefits in the form of higher human and social development thereby leading to lower income inequalities. On the contrary, as more of a country's resources are diverted towards military sector growth, the net positive influence on development would start declining forcing to increase income inequalities. Since South Asia's story fits exactly into this model, in the absence of any concrete research work on this region, this study based on the this theoretical

[3] Sometimes in Democracies where there are coalition governments face this dilemma for cutting of the development spending because due to coalition pressures the government would not be in a position to cut the non development spending and hence would be left with other option to go for a cut in development spending. Also given the fact that this is the era of globalization, where we see decline in rate of both direct and indirect taxes on the name of reforms, it becomes even harder for the government to mop up the additional resources to fund the military expenditure. This also puts the pressure of the governments to cut the development spending in order to continue the funding for military sector.

underpinning makes an attempt to examine as to how the military spending continues to expand and thrive at the cost of creating wider income inequalities. The rest of the paper is organized as follows: Section 2 of the paper presents research design and description of the variables. Section 3 discusses the results of estimating the models on cross-country time series data, while section 4 concludes.

2. Research Design

2.1. Modeling 'Income Inequality & Military Spending'

To investigate the impact of military spending on income inequality, we start with the standard model. We presume that the there is a direct effect of higher military spending on inequality levels in our sample countries. To capture this, we include Gini income inequality index as the dependent variable. We adopt this data from WIDER institute's Income Inequality data set – II (2007). The estimates of Gini coefficient are available only at points of time for the sample countries. We adopted interpolation technique to take the decline or growth in trend between two points in time and fill the data gapes between successive observations. There are also other studies who have adopted similar such approach like Jamal (2005) and Akmal et al. (2007). We first use a single equation method to investigate the impact of military spending on income inequality. We use pooled regression analysis with fixed effects method for all the models. The fixed effects method is performed in suspicion that there are other factors than those captured in our explanatory variables affecting the dependent variable(s). Thus, the model for income inequality can be specified in the following format:

$$\begin{aligned}\textbf{Log(Gini)} = {} & \delta_1 + \Omega_1 + \psi_2\, log(Milex)_{it} + \psi_3\, Milex * War\ years_{it} + \psi_4\, Milex * Peace\ years_{it} + \psi_5\, War\ years_{it} \\ & + \psi_6\, Pace\ years_{it} + \psi_7\, Political\ Regime_{it} + \psi_8\, log(Population)_{it} + \psi_9\, Secondary\ School \\ & Enrollment\ Ratio_{it} + \psi_{10}\, Government\ Expenditure_{it} + \psi_{11}\, log(Economic\ Development)_{it} + \\ & \psi_{12}\, log(External\ Aid)_{it} + \psi_{13}\, Time\ Dummy_{it} + \psi_{14} + Economic\ Development\ Squared_{it} + \psi_{15} \\ & Economic\ Growth_{it} + \psi_{16}\, Economic\ Development\ Economic\ Growth_{it} + \varepsilon_{it}\end{aligned}$$

..... (1)

ψ is the corresponding coefficients, Ω are the fixed effects to be estimated and ε is the error term. The model developed above for income inequality might face the problem of endogenity related to military spending. To counter this, we generate instrument variables to address the problem of endogenity. In this method, we create a variable or set of variables that is highly correlated with the endogenous variable and uncorrelated with the disturbance term. Thus, it needs to satisfy both these propositions:

$$\frac{IV * Y}{N} = \sigma_{AY} > 0$$

..... (2)

Where, IV is the Instrument Variable which we have formulated and Y is the endogenous variable. Therefore the instrument variable acts as proxy for the endogenous variable.

$$\frac{\mathbf{IV} * \boldsymbol{\varepsilon}}{\mathbf{N}} = \boldsymbol{\sigma}_{A\varepsilon} = \mathbf{0} \qquad \text{..... (3)}$$

It is quite difficult task to create the instrument variable(s) to satisfy both these aspects mentioned in equation 2 and 3. Hence we take the help of Two Stage Least Squares (TSLS) method. The advantageous feature of this method over Pooled Ordinary Least Squared (POLS) method is that, this creates an instrument that is correlated with the endogenous variable while uncorrelated with the disturbance term. That is, it separates the endogenous variable into two parts, one correlated with the disturbance term and another uncorrelated with the disturbance term. Then finally, it uses the second part as a substitute for endogenous variable to run the model.

In this whole process, we have to be careful in identifying the proper instrument variables which should best represent military expenditure not just closely but also see to that there is no reverse causality between the two. Taking this into account we construct two instrument variables namely, remittances and internal threat. We adopt the data for remittances in current US$ millions from world development indicators 2006 of World Bank. We define internal threat based on the data availability factor which can act as proxy. Thus, we thought internally displaced population and migrants from home country to foreign countries together form internal threat variable. The data is adopted from United States Committee for Refugees and Immigrants (USCRI), *World Refugee Survey* (Annual Series) of Monty G. Marshall, Center for Systemic Peace (2006).

Before, we get into the analysis of relationship between income inequality and military spending, as a curtain raiser, we present the model related to determinants of military spending in South Asia. There are many previous research studies that have worked on the determinants of military expenditure. Prominent among them are Maizels & Nissanke (1986); Dommen & Maizels (1988); Looney (1989); Hewitt, (1991); West (1992); Dunne & Mohammed, (1995); Batchelor et al (2002); Dunne & Perlo-Freeman (2003a); Dunne & Perlo-Freeman (2003). All these studies are based on cross-country regression models. Based on the literature, we formulate this model for South Asia with typical dependent variable as Military Expenditure in current US$ Millions, which includes both recurring and capital expenditure on defense. The data is adopted from the COW project study of Ghosn, Faten, Palmer & Bremer (2004) which ends the data in 2001. From there on, we took the data from World Development indictors 2006 of World Bank. Thus, our military expenditures equation is follows:

$$\begin{aligned}\textbf{Log(Milex)} = {} & \alpha_1 + \lambda_1 + \phi_2\, \textit{Arms Imports}_{it} + \phi_3\, \textit{Arms Trading}_{it} + \phi_4\, \textit{Peace years}_{it} + \phi_5\, \textit{War years}_{it} \\ & + \phi_6\, \textit{log(Rivals Milex(t-1))}_{it} + \phi_7\, \textit{log(Neighbors Milex(t-1))}_{it} + \phi_8\, \textit{log(Population)}_{it} + \\ & \phi_9\, \textit{log(Economic Development)}_{it} + \phi_{10}\, \textit{log(Armed Forces)}_{it} + \phi_{11}\, \textit{Time Dummy}_{it} + \eta_{it}\end{aligned}$$

..... (4)

ϕ is the corresponding coefficients, λ are the fixed effects to be estimated and η is the error term. This empirical analysis covers about four South Asian countries for the period 1975 to 2005. The pooled time-series cross-sectional (TCSC) data may exhibit Heteroskedasticity and serial correlation problems. While these problems do not bias the estimated coefficients as pooled regression analysis in itself is a more robust method for large sample consisting of cross section and time series data. However, they often tend to cause biased standard errors for coefficients, producing invalid statistical inferences. To deal with these problems, we estimated for all the models the Huber-White robust standard errors clustered over countries. These estimated standard errors are robust to both Heteroskedasticity and to a general type of serial correlation within the cross-section unit (Rogers, 1993 and Williams, 2000).

2.2. Key Independent Variables

There are several set of variables which are main as well as control variables in determining the income inequality. We start with the model 1 on income inequality. Apart from military spending, we include the most important variables namely, economic development and economic growth. We predict that as the countries progress leading to higher economic growth and development, there should be decline in income inequality. This is well argued based on the Kuznets hypothesis theory (Kuznets, 1955) and other vast literature on inequality which shows that the inequality tends to fall as there is higher economic growth and development (Ahluwalia, M.S. 1976, Robinson, 1976, Loury, 1981, Anand & Kanbur, 1993, Clarke 1995, Perotti 1996, Alesina & Perotti, 1996, Easterly 1999, Galbraith 1999, Barro, R.J. 2000, Forbes, 2000, Bourgignon & Morrisson, 2002, Banerjee & Duflo, 2002, Galbraith & Kum 2002, Ali & Galbraith, 2005). We obtain the data for both these variables from World Development indicators 2006 of World Bank. We then include political regime variable which captures for the differential levels between democracy and autocracy from Marshall & Jaggers, (2005). The level of Democracy is constructed from the Polity IV database which rates each country on a democracy-autocracy scale. First, in the data base an autocracy variable is available, ranging from 0 to 10, with a larger number indicating a more autocratic government. Also available is an analogous democracy index ranges from 0 to 10, but with a larger number means a more democratic government. Thus our variable is the democracy index minus the autocracy index, a measure called polity 2 in the database. It captures the extent to which a political regime is responsible to its people, the larger the number the stronger the democratic checks on the political system. We predict that a move towards greater democratization process often tends to associate with fall in inequality. Though we fully agree that this may not be true in all cases, keeping in mind the sample countries, wherein all of them excepting India are either autocracies or partial democracy, this variable becomes even more important. There is a vast literature which shows that increased levels of secondary school enrollment ratio leads to decline in income inequality levels as this would have an indirect effect on improving the poor socio economic conditions of the poor (Breen and Cecilia 1999, Fielding 2002, Fielding & Torres, 2005, Rohrbach, 2007). Basing on this argument, we included secondary school enrollment ratio which was adopted from the database of UNESCO. We believe that improvement in social sector spending has a spillover effect on reducing the poverty levels and also help in fall

of inequality levels. However, due to non availability of the data from 1975 for Pakistan and Bangladesh, we have to settle for total government expenditure, which is in our case the proxy for development spending. But there are studies in literature like Mupimpila (2005) and Davoodi et al. (2001) who found a robust relation between military spending and total government expenditure. The data for this also comes from World Bank's development indicators 2006. We also wanted to see whether the support in the form of external aid is helping reduce the inequality levels or otherwise. We included external aid in current US$ millions sourced from world development indicators. Finally, we use the updated version of Uppsala dataset (2007) which captures the civil war and external war presence and formulate number of war years variable. The COW project study of Sarkees, Meredith Reid (2000) extended version was used to take into account the number of peace years for the sample countries.

Coming to the model of determinants of military spending, we include the most important components like Arms Imports for which the data was secured from SIPRI database on arms trading. The increase in arms imports has a major say in increasing the military spending. The other important indicator is the Armed forces as often, the size of armed forces is an important determinant of military expenditures. Generally speaking, as the size of armed forces increases military spending should increase. We capture the effect of armed forces data partly from World Development Indicators and SIPRI's database. We also include arms trade by following the rule of Hamid Ali & Galbraith (2005) creating Arms Trading Index (ATI) to distinguish the countries that both import and export arms from countries that only import them. For this an interactive dummy variable is formulated which interacts the dummy with arms export years and then interacted with arms imports. This apart, we also include economic development, as we expect that higher economic development process leads to higher military spending to cater to the needs of military sector demand. Similarly, we also include war years and number of peace years as the former leads to greater increase in military spending, while the later is always associated with reduction in military spending (Mohammad, 1999). Literature highlights that neighbors military spending often drives the home country military expenditure (Sandler & Hartley, 1995; Smith, 1995 Sun & Yu, 1999, O¨cal, 2003). To capture this effect, we not only consider the neighbor's military expenditure, but we went a step ahead in also creating the dataset on rival's military expenditure. For example, For India, the rival's military spending includes that of Pakistan, China and Bangladesh. For Pakistan and Bangladesh, it would be India's military spending. For Sri Lanka however, the problem is internal as the war is waged within the country with LTTE rebels. But, the absence of data on military spending of LTTE group forced us to take into account a proxy which can closely associate with rival's military spending[4]. Therefore, we take into account number of terror events for Sri Lanka as best available proxy.

3. Empirical Results & Estimates

This section presents the results of regression estimates in assessing the impact of military spending on income inequality in South Asia. We present three models first of which includes determinants of military spending (table 1) followed by the main model

[4] The data for number of terror events was adopted from Terrorism Knowledge Base (TKB) www.tkb.com

explaining the relationship between income inequality and military spending (table 3). We then control for endogenity problem of military spending and introduce Two State Least Squared (TSLS) as the third model and also conduct endogenity test (table 4). Each model consists of one standard model followed by other models which deal with introducing other important variables and interaction affects variables. Other important statistics for each model are presented at the end of each table. All the results include white Heteroskedasticity-consistent standard errors & covariance to counter the problem of Heteroskedasticity.

We begin with model – 1, the results provide the first impression about the determinants of military sector spending in South Asia. The most interesting findings include that of war and peace years. When we introduced number of war years, we find a significant positive relationship with military spending. When we replaced this with number of peace years in the model 2, we find the results to be negative and statistically significant at 1% confidence level. However, the coefficient values for the both differs as we find that for peace years its slightly higher than war years, suggesting that peace brings reduction in excess military spending, which can be utilized for social sector development.

Table 1: Results of Military Expenditure equation

Dependent Variable: Log Military Expenditure (US $ Mn)

Variables	**Standard Model 1**	**Model 2**
Constant	-3.182 (25.643)	-5.883 (27.61)
Arms Imports	0.001 * (4.14E)	0.001 * (4.02E)
Arms Trading Interaction	-1.94E (2.66E)	-1.48E (2.60E)
War Years	0.013 ** (0.005)	----
Peace Years	----	-0.027 * (0.009)
Log(Rivals Military Spending (t-1))	0.048 + (0.034)	0.060 *** (0.036)
Log(Neighbors Military Spending(t-1))	0.699 * (0.181)	0.769 * (0.166)
Log(Population)	0.262 (1.460)	0.206 (1.519)
Log(Economic Development)	0.618 + (0.447)	1.039 ** (0.424)
Log(Armed Forces)	0.510 * (0.145)	0.466 * (0.142)
Time Trend	-0.007 (0.035)	-0.017 (0.039)
R-squared	0.958879	
Adjusted R-squared	0.954267	

F-statistic	207.9238	
Prob(F-statistic)	0.000000	0.000000
Total Observations	124	

Note: * Significant at 1% confidence level; ** Significant at 5% confidence level; *** Significant at 10% confidence level; + Significant at 15% confidence level. The models are controlled for Heteroskedasticity. White Heteroskedasticity-Consistent Standard Errors are reported in parenthesis.

Though we find arms trading interaction variable to be insignificant, we find that arms imports is significant at 1% confidence level in both the models. Higher the arms imports, greater the spending on military sector. The descriptive statistics detailed in table 2 tell the story about the arms imports in South Asia. On an average the arms imports went up from 1975 – 1985 period to 1985 – 1994 period and then steadily declined during 1975 – 2005 period for all countries excepting Sri Lanka.

Table 2: Arms Imports (average) in South Asia

(Number of weapons)

Period	India	Pakistan	Sri Lanka	Bangladesh
1975 - 1984	1898.2	549.9	10	69
1985 -1994	2558.3	618	43.2	110.1
1995 - 2005	1421.27	492.73	67.73	75.55
1975 - 2005	1941.90	551.58	41.19	84.58

Source: SIPRI database on Arms Imports

In the case of India, Pakistan and Bangladesh, the yesteryears of 1970s and 1980s were the most tensed periods[5] and hence more arms imports leading to greater defense build up in the region. However, during the mid 1990s to the present date, the average arms imports have considerably declined in these three countries, thanks to the ongoing peace process along with some reasonably good confidence building measures between India and Pakistan on border issue of Kashmir and similarly in the cases of India and Bangladesh and Indo-China. However, the case of Sri Lanka is unique as it has had no rivalry with its neighbors in the past. But, the country faces different kind of challenges in the form of armed internal state conflict initiated by the rebel LTTE militant group. The conflict between LTTE and government broke during 1983 and has been on surge since then. From the late 1980s the violence increased drastically and hence we can see a steady growth of arms imports for Sri Lanka during those three points of time.

We introduced both the rivals and neighbors military expenditure in lagged values to see their effect on individual military sector spendings in the current year. Interestingly, we find that though both are relevant and are statistically significant too, the importance of neighbors' military expenditure plays a key role in determining the military expenditure of the host country. The coefficient value of neighbors' military spending variable is very strong in comparison to the rival's military expenditure. However, we chose to downplay

[5] In 1971 India helped Bangladesh attain independence by waging the war against Pakistan. The years followed by, there was a greater defense built up activities in both India and Pakistan on the issue related to Kashmir. Also, the cold war between US and USSR was also partly responsible for some tensed moments as India's proximity with USSR saw US supporting the Pakistan in building their military capabilities in the form of arms exports and R&D support.

this importance and be cautious in reading the results of these two simply because, we could not manage the data of rivals' military spending of LTTE group for Sri Lanka and choose to include number of terror events instead. Therefore, though the results are fairly strong, to an extent, reading too much into it to make a strong conclusion would not be accurate. The population levels though is insignificant, we find that economic development process is positively associated with higher levels of military spending and is statistically significant in both models. Finally, we include the armed forces size relative to population levels. We find in both the models that an increase in armed forces is positive and is statistically significant at 1% confidence level. The results show that a 1% increase in armed forces leads to an increase of 51% in military expenditure. The data on armed forces show that there has been a steady increase in armed forces from 2002 onwards for India, Pakistan and Bangladesh, while there was a sudden surge in the case of Sri Lanka ever since the civil war broke out during 1983.

We now move towards our main model whose focus is on the interrelationship between income inequality and military sector spending. Beginning with the standard model 3, we find the results on the expected lines of our arguments which we made earlier. We find that military expenditure is positively associated with income inequality in South Asia. In most of the models specified, it is statistically significant. We see that a 1% increase in military spending is leading to a 2% increase in income inequality. We then interacted the military expenditure with both peace and war years to see their effect on income inequality (see models 7 & 8). We find that military expenditure during the peace years has a significant negative effect on income inequality and is statistically significant at 5% confidence level. However, we could not find any statistical significance for military spending during the war years.

Table 3: Results of Income Inequality equation

Dependent Variable: Log GINI

Variables	**Standard Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Constant	-7.164 * (2.562)	-7.389 * (2.223)	-10.79 * (3.036)	-7.690 * (2.180)	-6.444 ** (2.605)	-7.750 * (2.200)
Log(Military Expenditure)	0.020 ** (0.010)	0.006 (0.010)	-0.002 (0.010)	0.020 ** (0.010)	-----	-----
Military Expenditure X War Years	-----	-----	-----	-----	-----	6.19E (5.46E)
Military Expenditure X Peace Years	-----	-----	-----	-----	-1.45E ** (7.25E)	-----
War Years	0.002 * (0.000)	-----	0.003 * (0.000)	0.002 * (0.000)	0.001 ** (0.000)	-----
Peace Years	-----	-0.007 * (0.001)	-----	-----	-----	-0.007 * (0.001)
Political Regime?	-0.002 ** (0.000)	-0.003 * (0.000)	-0.002 * (0.000)	-0.001 ** (0.000)	-0.003 * (0.000)	-0.003 * (0.000)
Log(Population)	0.331 ** (0.131)	0.367 * (0.116)	0.721 * (0.171)	0.354 * (0.114)	0.307 ** (0.134)	0.383 * (0.115)

Log(Economic Development)	0.662 * (0.081)	0.625 * (0.072)	-----	0.694 * (0.068)	0.626 * (0.082)	0.656 * (0.077)
Secondary School Enrollment	-0.005 ** (0.001)	-0.005 * (0.001)	-0.003 * (0.001)	-0.005 * (0.001)	-0.005 * (0.001)	-0.004 * (0.001)
Government Expenditure	-0.008 * (0.004)	8.18E (0.004)	-0.003 (0.003)	-0.008 ** (0.003)	-0.002 (0.004)	0.001 (0.004)
Log(External Aid)	0.047 * (0.011)	0.041 * (0.012)	0.043 * (0.011)	0.046 * (0.011)	0.052 * (0.011)	0.039 * (0.012)
Time Trend	-0.019 * (0.004)	-0.017 * (0.003)	-0.025 * (0.004)	-0.020 * (0.003)	-0.016 * (0.004)	-0.017 * (0.003)
Economic Development	-----	-----	0.002 * (0.000)	-----	-----	-----
Economic Development Squared	-----	-----	-7.13E * (2.25E)	-----	-----	-----
Economic Growth	-----	-----	-----	-0.010 * (0.002)	-----	-----
Economic Development X Growth	-----	-----	-----	5.62E (6.04E)	-----	-----
R-squared	0.917167	0.928419	0.932387	0.936633	0.916687	0.928875
Adjusted R-squared	0.908212	0.920680	0.924396	0.928495	0.907680	0.921186
F-statistic	102.4206	119.9739	116.6844	115.0821	101.7768	120.8035
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Total Observations	124					

Note: * Significant at 1% confidence level; ** Significant at 5% confidence level *** Significant at 10% confidence level. The models are controlled for Heteroskedasticity. White Heteroskedasticity-Consistent Standard Errors are reported in parenthesis.

The results related to introduction of both war and peace years show that an increase in war years has a positive effect of income inequality leading to 0.20% increase for every 1% hike. However, we find that the increase in peace years is leading to decline in income inequality. Though we agree that the coefficient values are very low, but nevertheless the results show that there is a direct relationship between military sector spending and income inequality at the backdrop of war and peace years. The interesting finding however is that 1% increase in peace years leads to 0.70% decline in income inequality, which is infact higher than the effect of war years on inequality. This once again reiterates the fact that war is detrimental to development and progress.

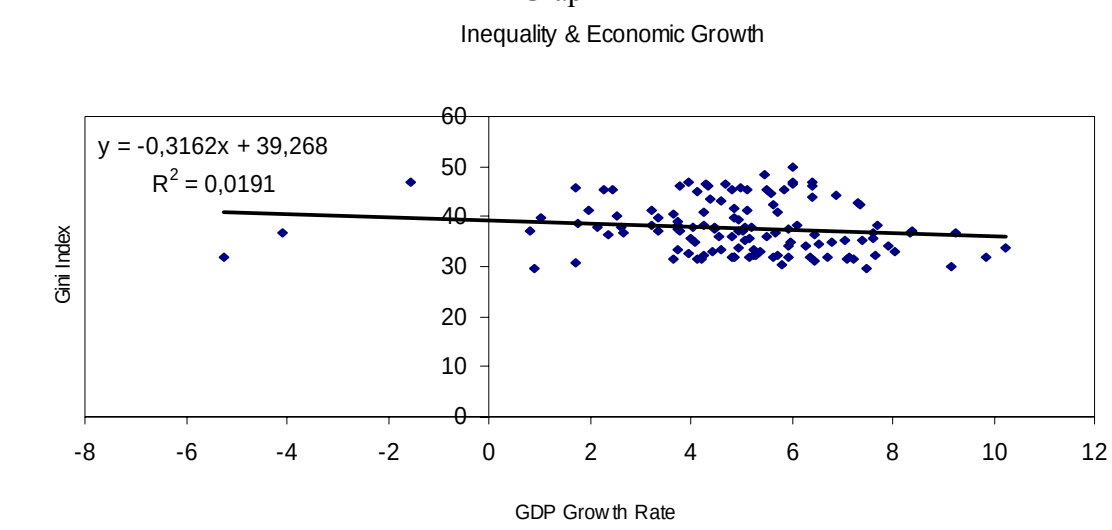
Most of the South Asian economies excluding India are not full democracies. Sri Lanka is widely recognized partial democracy[6] and ever since the civil war broke out in 1983, the autocracy levels have increased. Pakistan and Bangladesh have been often prone to military coups and thereby ending up as autocracies. During its 38 years of independent years, Bangladesh was under military rule for 18 years. The same is the case with Pakistan also. We believe that autocracies are associated with higher levels of income

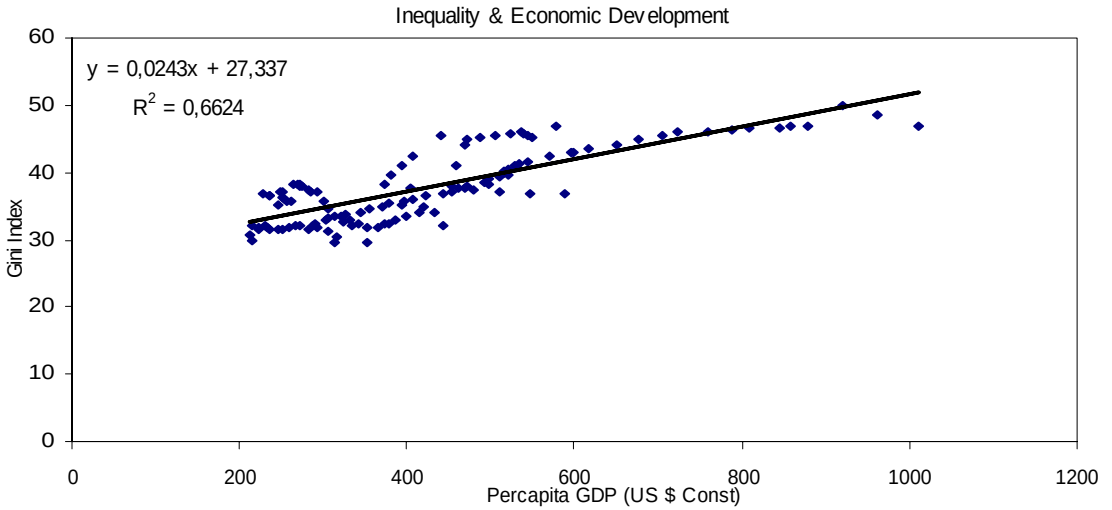
[6] Partial Democracy is said when the POLITY score for a country is between -5 to +6, while -5 to -10 is recognized as fully Autocratic country and +7 to +10 is deemed to be a fully democratic state (Marshall & Jaggers, (2005)).

inequalities as development process in autocratic countries is low. Though full democracy might not lead to complete decline in income inequality, but the levels of inequality in democracy can be lower compared to autocracies because in democracy the policy making bodies are accountable for the policies implementation process. To capture this effect, we include political regime variable which show a consistent negative sign which is statistically significant. Though the coefficient values are lower across the models, it proves that there is some association between democracy and income inequality. This shows that movement towards democracy is leading to decline in income inequality levels atleast in South Asia.

Economic Development and population levels are positively associated with income inequality. Higher levels of population may certainly prove difficult for the government to deliver the public services and hence it might lead to income inequality. But we are now seeing the results of economic development being positive and this is also statistically significant across the models. A 1% increase in economic development is leading to 62% increase in income inequality.

Graph 1





This tells us that development process in South Asian countries is not inclusive. Infact this is precisely one of the reasons why income inequalities in these countries are still at a higher levels. Though the economic reforms process have ushered higher levels of economic growth, its benefits are not reached to the poor. The scatter chart shows the relation between economic development and income inequality for these four countries. The fit seems to be good as it depicts a perfect linear trend, suggesting the economic development indeed is leading to higher income inequalities. Further, we introduced economic growth in our model 6 along with economic development. There we find that economic growth is making a negative impact on income inequality, while the relation of economic development remains unchanged. However, the coefficient value of economic growth is very low compared to that of economic development. It shows that a 1% increase in economic growth is leading to a 1% reduction in income inequality and on the contrary, it is almost 70% increase in income inequality for every 1% increase in economic development. This shows that though economic growth is helping in reducing the income inequality, but this is not enough, as it is not translating into real gains interms of economic development, which is a proxy for standard of living. With this analysis one can argue that economic progress in the South Asian countries is not inclusive. There is much more interesting evidence to add further to these results. When we take a look at model 5, we find that the economic development when squared has a significant negative impact on income inequality. This is statistically significant at 1% confidence level. Thus, it shows that the present level of economic development is not sufficient to bring down the prevailing income inequality level. Certainly there is a need to further accelerate the economic development process in order to reduce the inequality by bringing into fold the deprived sections of the society into the 'growth story'. In model 6, along with economic growth and economic development, we also introduce interaction between economic growth and development. We find that its impact is positive, but is not making any significant impact on inequality. Theoretically speaking, if a country meets the condition of high income and high growth, inequality should eventually fall because people in the country would get employment opportunities with higher levels of salaries. But, this seems to be quite opposite in the case of South Asian economies as the results show that the real benefits of higher economic growth is not translating into high economic development.

This being so, on the other hand, the social development process interms of secondary school enrollment ratios help reducing the income inequality. The results are statistically significant at 1% confidence level and are consistent across all the models. There is a moderate improvement in the case of Sri Lanka, India and Bangladesh. However, the case of Pakistan remains worrying as the progress shown is very little. Perhaps this is the reason why, the coefficient values are very low in this case. We also find that the government expenditure help reducing the income inequality. However, two things worth noting: the coefficient values are very lower at 0.80% suggesting that there is a scope for further improvement interms of better targeting the poor and increase spending on social and rural sector development schemes and projects and secondly, the significance level is not consistent across the models, suggesting the relationship is fragile. We also find the population levels are acting as burden interms of increasing the income inequality in these countries. The results are consistent throughout the models and the coefficient

values are reasonably strong. Past research also shows that higher levels of population are detrimental to the efforts to reduce income inequality in developing countries, where the public services are already in a bad shape. One of the other interesting findings of the study is the relationship with external aid. We find that the relationship is positive and is also statistically significant at 1% confidence level. This result is also exhibited throughout the six models. This goes on to show that the increase in external aid is not effecting the reduction in income inequality. This brings us to the question on the usage of the external aid by respective governments. There is no evidence to suggest that the entire funds allotted under external aid category is properly spent by the governments and that is precisely why it makes minimum or not impact on reduction of income inequality. The best example perhaps is Pakistan as it received large sums in the form of aid from various developed countries like United States, but the situation at the ground level infact turned worst during the recent years. Finally, the time dummy shows a significant negative impact on income inequality in South Asia countries suggesting that as time pass by, there is an improvement in reduction on inequality.

Those countries which are crippled with higher inequality levels and also have very high military dominance in the form of increased spending on military sectors like Pakistan, Bangladesh and to a minor extent Sri Lanka, feel that this could bring in more stability because military force help suppressing the dissidents in the society. However, on the flip side, there is an opportunity cost associated with higher levels of military spending as the growth in military expenditure comes at the cost of social sector spending. The classic example of such case is Pakistan and to an extent Sri Lanka. Thus, it goes on to show that there is a direct effect of military sector growth on income inequalities. This means that the regression results specified above are valid as long as there is no endogenous variable bias in the models. However, if we have the problem of endogenous variable, in other words, if military spending variable is endogenous to income inequality then in such a case we need to deal with the issue of endogenity and to find ways to obtain unbiased and consistent estimates. If estimates using a single equation model are biased and inconsistent, then it becomes necessary to estimate the determinants of income inequality with instruments that may be used to treat the endogenity bias coming from military sector growth. Therefore, in order to address the problem of endogenity, we create instrument variables for the endogenous variable (military expenditure). We postulate two instrument variables viz., internal threat and remittances. We were careful in choosing these variables because one of our major objectives was to see to that the instrument variables do not create reverse causality effect with the identified endogenous variable. We use Two Stage Least Square (TSLS) method for estimating the income inequality model again this time with instrument variables. The process of implementing TSLS is as follows: in the first-stage regression, we obtain the "estimated income inequality" and in the second stage we replace the military expenditure by the two instruments variables in equation (1) to obtain coefficient βi for equation (1).

Table 4: Results of Military Expenditure equation with TSLS

Dependent Variable: Log Military Expenditure (US $ Mn)

Variables	**TSLS Model - 9**	**Endogenity Test (**stage 2**) Model - 10**

Constant	-9.163 * (3.152)	-6.486 ** (2.561)
Log(Military Expenditure)	0.062 *** (0.036)	0.030 * (0.011)
War Years	0.001 ** (0.000)	0.001 * (0.000)
Political Regime?	-0.001 (0.001)	-0.002 ** (0.000)
Log(Population)	0.401 * (0.150)	0.330 ** (0.132)
Log(Economic Development)	0.747 * (0.105)	0.584 * (0.067)
Secondary School Enrollment	-0.007 * (0.001)	-0.006 * (0.001)
Government Expenditure	-0.013 ** (0.005)	-0.005 (0.004)
Log(External Aid)	0.037 * (0.013)	0.029 * (0.010)
Time Trend	-0.025 * (0.006)	0.368 * (0.118)
Residuals (t-1)	----	-0.017 * (0.004)
R-squared	0.958879	0.932151
Adjusted R-squared	0.954267	0.923830
F-statistic	207.9238	112.0221
Prob(F-statistic)	0.000000	0.000000
Instrument Variables used	a. Remittances b. Internal Threat	----
Total Observations	124	

Note: * Significant at 1% confidence level; ** Significant at 5% confidence level; *** Significant at 10% confidence level. The models are controlled for Heteroskedasticity. White Heteroskedasticity-Consistent Standard Errors are reported in parenthesis. Model 09 is Two Stage Least Squares method, while model 10 is OLS with fixed effects method.

Model 9 shows that the estimates generated from the system of equations are highly robust. Overall, we find that the inequality model 9 provide the best fit to the data, with R-squared of 96% and adjusted R-squared value of 95%. These are higher than the earlier single equation models 3 to 8. We find that the military expenditure if increased by 1% is leading to an increase in 6.2% of income inequality. If we take a look at the coefficient value of military expenditure and compare this with the values in the models 3 to 8, we find that the value derived from model 9 has increased by six basis points. This is the effect of the two instrument variables which we have introduced into this model. Not only this, we find that there is a marginal increase in the coefficient values of almost all the variables in the model.

Though we have the results of the TSLS with instrument variables for the endogenous variable, military spending, we would like to ensure whether there is possible endogenity

or not in between the two (income inequality & military expenditure). For this, we perform endogenity test. The values displayed of the model 10 are the final results of the total endogenity test. We begin with the first stage in endogenity testing. We introduce two instrument variables viz., remittances and internal threat variables into the structural equation model and we replace the dependent variable with military expenditure variable. We the run the model for this equation and we find that both the instrument variables are statistically significant at 1% confidence level against military expenditure. This shows that both the instrument variables which we have selected are the perfect fit for military expenditure. We name it model 11 and place these results in Annexure – 1 at the end. As a part of second step, we take the residuals of the TSLS model (model 9) and introduce those residuals as a separate independent variable in the single equation model with income inequality as dependent variable. The results are reported in model 10. We find that residuals of statistically significant at 1% confidence level suggesting that there is a genuine case of endogenity. In the same model, we also find that military expenditure remains statistically significant at 1% confidence level.

4. Summary & Conclusion

This study attempts to examine the effect of military spending on income inequality in four major South Asian economies from 1975 to 2005 time frame. We anticipate that as military expenditure increases, income inequality also increases, controlling for other key macro economic and institutional variables. Our findings show that there is a positive effect of military expenditure on income inequality. We base this model on the premise of *opportunity cost burden effect* theory which argues that that expenditure on military drains out the resources from public spending on social sector development, rural development spending, development of infrastructure and other social welfare programs that unarguably promotes social and human development and reduce income inequalities. Moving further, we also find there is a strong direct relationship between wartime military spending and income inequality and an inverse relationship between peacetime military spending and income inequality. This apart, we also find that economic growth though is leading to a slight decline in income inequality, but economic development process strongly encourages income inequalities in South Asia. This goes on to show that the economic growth is not translating into development and progress of all sections in the society. This suggests that the growth and development process in South Asia is not inclusive but exclusive.

The major criticism raised by our paper pointing at the existing literature is about the problem of endogenity. We address this problem by introducing appropriate instrument variables using Two Stage Least Squares method. The instrument variables used includes: Remittances and Internal Threat, which do not cause for reverse causality. Before selecting the instrument variables, we tested for the problem of endogenity, which clearly shows that there is a serious problem of endogenity between military spending and income inequality. We then also conducted the test to know whether the instrument variables which were selected were appropriate or otherwise. The results proved to be positive for the both. The results of Two Stage Least Squares are no different, but

certainly there is an improvement in the coefficient value of the endogenous variable (military spending), justifying the introduction of both instrument variables.

Finally, we developed a simple model of determinants of military spending which we believe is the function of greater military activities (arms imports, arms trading, armed forces), conflict variables (presence of civil war and number of peace years), macro economic, and institutional variables. We obtain estimates that are robust, and are consistent with the literature. We strongly believe that given the range of socio economic and political problems ailing South Asian countries, these results gain paramount importance, suggesting that reduction in military spending could reduce income inequality, thereby paving way for economic development and progress.

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ANNEXURES

Annexure 1: Results of Endogenity Test (Stage 1)

Dependent Variable: Log (Military Expenditure)

Variables	Model - 11
Constant	26.03 (19.66)
Remittances	-3.48E * (1.50E)
Internal Threat	0.001 * (0.000)
War Years	0.006 (0.005)
Political Regime	-0.015 ** (0.006)
Log(Population)	-0.638 (1.001)
Log(Economic Development)	-1.176 ** (0.583)
Secondary School Enrollment	0.028 * (0.009)
Government Expenditure	0.095 * (0.030)
Log(External Aid)	0.154 *** (0.080)
Time Dummy	0.098 * (0.031)
R-squared	0.968147
Adjusted R-squared	0.964383
F-statistic	257.1852
Prob(F-statistic)	0.000000
Total Observations	124

Note: * Significant at 1% confidence level; ** Significant at 5% confidence level; *** Significant at 10% confidence level. The model is controlled for Heteroskedasticity. White Heteroskedasticity-Consistent Standard Errors are reported in parenthesis.

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